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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/932,055 | 08/16/2001 | Simon Dodd | 10007744-1 | 5019 |

7590 05/01/2006

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| EXAMINER | |
|---|---|
| UMEZ ERONINI, LYNETTE T | |
| **ART UNIT** | **PAPER NUMBER** |
| 1765 | |

DATE MAILED: 05/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/932,055 | DODD, SIMON | |
| | Examiner | Art Unit | |
| | Lynette T. Umez-Eronini | 1765 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *09 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-3,5,11-14 and 21-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,11-14 and 21-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *8/16/01* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

This communication is in response to Applicant's Remarks filed 3/9/2006, which were persuasive in showing the previous arguments are moot with respect to claims 11-14 because the prior art failed to address depositing a metal layer over an entire top surface of the passivation material because the said limitation was not claimed, Hence a new rejection is presented.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-3, 5, and 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hostetler (US 6,675,476 B2 in view of Wong et al. (US 5,211,806).

As to claims 1-3, 5, and 21-26, Hostetler teaches, "The printhead structure **100** includes a silicon substrate **102** on which various patterned layers have been formed to fabricate the thin film structure, shown generally as **101** in FIG. **1B**. The thin film structure details will vary in dependence on the particular printhead design. FIGS. **1A-1B** illustrate in simplified form some of the patterned layers defining an exemplary thin film structure. These include a field oxide layer **104**, a polysilicon layer **106** (same as applicants' conductive material for a heat transducer), a passivation layer **108** including silicon carbide and silicon nitride layers, a tantalum layer **110** (same as applicant's metal layer) to define heating resistors for the printhead. Not shown, for example is an aluminum layer defining wiring traces" (column 4, lines 1-12).

"FIG. **1A** is a top plan view of the printhead structure **100** after the first step of the fabrication process, i.e. after the inkjet thin film structure has been formed on the silicon substrate. FIG. **1B** is a cross-sectional view of the printhead structure **100** after the TMAH etch process has been performed to create a break trench and after the barrier layer **112** is applied" (column 3, lines 61-67). The above reads on,

A method of etching a substrate surface, comprising the steps of:

masking a first portion of the substrate surface with passivation material having edges that define boundaries on the substrate surface such that within the boundaries a second surface portion is exposed for etching;

depositing a metal layer over the passivation material; and then

etching the second surface portion, **in claims 1, 21, and 22**;

wherein the masking step includes depositing a layer of silicon nitride on the substrate surface and the depositing on the silicon nitride a layer of silicon carbide, **in claim 2**;

A method of etching a portion of a substrate surface, comprising the steps of:

masking the surface with passivation material having edges that define boundaries of the surface portion such that within the boundaries the surface portion is exposed for etching;

depositing a metal layer over the passivation material: and then

etching the surface portion and

fabricating on the substrate drop generator layers that provide for controlled expulsion of liquid from the substrate, and wherein the step of masking with the passivation material includes the simultaneous deposition of the passivation material at a location away from the exposed surface portion to enable use of some of the passivation material as one of the drop generator layers as well as the mask, **in claim 3**;

A method of etching a portion of a substrate surface, comprising the steps of:

fabricating on the substrate drop generator layers that provide for controlled expulsion of liquid from the substrate;

masking the surface with passivation material having edges that define boundaries of the surface portion such that within the boundaries the surface portion is exposed for etching;

depositing a metal layer over the passivation material: and then

etching the surface portion;

wherein the step of covering the passivation material with the metal layer includes the simultaneous deposition of the metal layer at a location away from the exposed surface portion to enable use of some of the metal layer as one of the drop generator layers, **in claim 5**;

Hostetler differs in failing to teach depositing a metal layer over an entire top surface of the passivation material, **in claims 1, 3, and 5**.

Wong discloses, "Next, referring now to FIG. 6, a conductive layer **42** is formed over passivation layer **40 (column 3, lines 40-41)**.

Wong illustrates deposition a metal layer over an entire top surface of a passivation material is known. Hence it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Hostetler by deposition a metal layer over an entire top surface of a passivation material as taught by Wong because such deposition is known in fabricating inkjet printhead (Wong, Abstract).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hostetler (US 6,675,476 B2) as applied to claims 1 and 6 respective above, and further in view of Kawamura et al. (US 6,543,884 B1).

Hostetler differs in failing to the step of underlying the passivation material with a layer of phosphosilicate glass at locations near the boundaries, **in claim 4**.

Kawamura teaches, " . . . ink ejection elements (same as applicant's drop generator), are formed on a top surface of a silicon substrate . . . An orifice layer is

formed on the top surface of the thin film layers to define the nozzles and ink ejection chambers. A phosphosilicate glass (PSG) layer, providing an insulation layer beneath the resistive layers, is etched back from the ink feed holes and is protected by a passivation layer to prevent the ink from interacting with the PSG layer (Abstract). FIGS. **4**, **8**, and **10**A – **10**E, and **11** show a plurality of thin films (column 4, lines 19-21), which comprises: FOX **92**, PSG **92**, TaAl **62**, $Si_3N_4$ **96**, SiC **98**, Ta **100**, and Au **114**.

Since Kawamura illustrates the step of underlying the passivation material with a layer of phosphosilicate glass (PSG) at locations near the boundaries, then it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Hostetler's technique of fabricating an inkjet printhead for the purpose of effecting the manufacture of a inkjet printhead.

### *Claim Rejections - 35 USC § 102*

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Hostetler (US 6,675,476 B2).

Hostetler teaches, "The printhead structure **100** includes a silicon substrate **102** on which various patterned layers have been formed to fabricate the thin film structure, shown generally as **101** in FIG. **1B**. The thin film structure details will vary in

dependence on the particular printhead design. FIGS. **1A-1B** illustrate in simplified form some of the patterned layers defining an exemplary thin film structure. These include a field oxide layer **104**, a polysilicon layer **106** (same as applicants' conductive material for a heat transducer), a passivation layer **108** including silicon carbide and silicon nitride layers, a tantalum layer **110** (same as applicant's metal layer) to define heating resistors for the printhead. Not shown, for example is an aluminum layer defining wiring traces" (column 4, lines 1-12). Hostetler also teaches "Alternatively, instead of using the FOX layer as the mask . . ., the passivation layer (SiN/SiC) can be employed for this purpose. . . . After the TMAH etch process, a break trench **124** (FIG. **1**B) is formed in the substrate **102** (column 4, lines 1-34). "The drill slot **126** preferably enters the bottom of the trench **124** . . . and can be remove to create the feed slot for the printhead" (column 4, lines 61-65). The aforementioned read on,

providing a layer on the substrate; and then

etching the substrate to form the trench in the substrate, wherein the trench extends from a surface of the substrate on which the layer is provided only part of the way through the substrate, **in claims 11**;

wherein the providing step includes growing a layer of oxide to serve as a transistor component of the drop generator as well as the mask, **in claim 12**; and

including the step of capping the oxide layer near the trench with a layer of passivation material, **in claim 13**.

Since Hostetler teaches a method of forming an inkjet printhead using the same materials as method as claimed by Applicants, then using Hostetler' method and

materials in the same manner as claimed in the present invention would inherently read on and result in,

A method of fabricating multiple layer of a thermal injet printhead that includes a substrate and a trench for moving ink across the substrate, as well as drop generator components for ejecting drops of ink form the substrate, comprising the steps of:

providing a layer on the substrate to serve as a drop generator component; and then

etching the substrate to form the trench in the substrate, wherein the trench extends from a surface of the substrate on which the layer is provided only part of the way through the substrate, **in claim 11**; and

wherein the providing step comprises depositing a layer of passivation material to serve as both a drop generator component and the mask, **in claim 14**.

7. Claims 23-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Hostetler (US 6,675,476 B2).

As to claims, and 23-26, Hostetler teaches, "The printhead structure **100** includes a silicon substrate **102** on which various patterned layers have been formed to fabricate the thin film structure, shown generally as **101** in FIG. **1B**. The thin film structure details will vary in dependence on the particular printhead design. FIGS. **1A-1B** illustrate in simplified form some of the patterned layers defining an exemplary thin film structure. These include a field oxide layer **104**, a polysilicon layer **106** (same as applicants' conductive material for a heat transducer), a passivation layer **108** including silicon

carbide and silicon nitride layers, a tantalum layer **110** (same as applicant's metal layer) to define heating resistors for the printhead" (column 4, lines 1-11). Hostetler also teaches, After the TMAH etch process, a break trench **124** (FIG. **1**B) is formed in the substrate **102** (column 4, lines 1-34). "The drill slot **126** preferably enters the bottom of the trench **124** . . . and can be remove to create the feed slot for the printhead" (column 4, lines 38-65). The combination of Hostetler's polysilicon **106** and passivation layer **108** is the same as applicants drop generator. Hence, the above reads on,

A method of etching substrate surface comprising:

fabricating, on a substrate, a drop generator component that provides for controlled expulsion of liquid;

depositing a passivation material on a first portion of the substrate surface and subsequently removing a portion of the deposited passivation material from a second portion of the substrate surface within the first portion, such that the second portion is free of passivation material;

depositing a metal layer over the passivation material and

etching the second portion, **in claims 23-26**.

### *Response to Arguments*

8. Applicant's arguments filed 3/9/2006 have been fully considered but they are not persuasive. Applicant traverses the rejection of claims 1-3, 5-7, 8, 10-14, and 21-26 under 103 (a) as being unpatentable over Hostetler (US 6,665,476) in view of Wong et al. (US 5,211,806) and cancelled claims 6-10.

As to claims 1, 3, and 5, Applicant argues it would not have been obvious for someone skilled in the art to modify Hostetler by depositing a metal layer over the entire surface of the passivation material as disclosed in Wong and such combination results in a non-functional device. Applicant's argument is unpersuasive because Wong is relied upon to teach and illustrate deposition of a metal layer over an entire top surface of a passivation material is known. Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Hostetler by deposition a metal layer over an entire top surface of a passivation material as taught by Wong because such deposition is known in fabricating inkjet printhead (Wong, Abstract).

Applicant traverses the rejection of claims 2, 4, and 21-22 as being unpatentable over Hostetler in view of Kawamura et al. (US 6,534,884) for failing to disclose or suggest depositing a metal layer over the entire surface of the passivation material.

It is acknowledged Kawamura fails to teach depositing a metal layer over the entire surface of the passivation material. However Kawamura is relied upon to teach the step of underlying the passivation material with a layer of phosphosilicate glass at locations near the boundaries. Kawamura teaches, " . . . ink ejection elements (same as applicant's drop generator), are formed on a top surface of a silicon substrate . . . An orifice layer is formed on the top surface of the thin film layers to define the nozzles and ink ejection chambers. A phosphosilicate glass (PSG) layer, providing an insulation layer beneath the resistive layers, is etched back from the ink feed holes and is protected by a passivation layer to prevent the ink from interacting with the PSG layer

(Abstract). FIGS. **4**, **8**, and **10**A – **10**E, and **11** show a plurality of thin films (column 4, lines 19-21), which comprises: FOX **92**, PSG **92**, TaAl **62**, $Si_3N_4$ **96,** SiC **98**, Ta **100**, and Au **114**.

Since Kawamura illustrates ((Abstract) FIGS. **4**, **8**, and **10**A – **10**E, and **11** show a plurality of thin films (column 4, lines 19-21), the step of underlying the passivation material with a layer of phosphosilicate glass (PSG) at locations near the boundaries and temporarily covering the surface portion of the substrate with a layer of phosphosilicate glass that is removed before etching of the surface portion and the use of PSG material in the manufacture of inkjet printhead is known, then it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Hostetler's technique of fabricating an inkjet printhead for the purpose of effecting the manufacture of a inkjet printhead.

9. Applicant's arguments, see Remarks, filed 3/9/2006, with respect to the rejection(s) of claim(s) 11-14 under 35 U. S. C. 103 (a) over Hostetler (US 6,675,476) in view of Wong et al. (US 5,211, 806) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Hostetler (US 6,675,476).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Art Unit 1765

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NADINE G. NORTON
SUPERVISORY PATENT EXAMINER

March 23, 2006